

Policy Research

WORKING PAPERS

Development Economics

Office of the Vice President
The World Bank
May 1992
WPS 905

Investing in *All* the People

Lawrence H. Summers

Money spent increasing the education of girls is not only more socially productive than military outlays. It is also far more productive than other social sector outlays — and than the vastly larger physical capital outlays projected for the next decade.

This paper, by the Vice President, Development Economics, and Chief Economist, World Bank, was prepared for the Quad-i-Azam Lecture at the Eighth Annual General Meeting of the Pakistan Society of Development Economists in Islamabad, Pakistan, in January 1992. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Maria Fernandez, room S9-035, extension 33766 (26 pages, including tables).

Recent research has convinced Summers that once all the benefits are recognized, investment in the education of girls may be the highest return investment available in the developing world — and it is an especially high priority for Pakistan. Summers stresses five points to make his case for action:

- Tens of millions of women (perhaps as many as 100 million) are missing worldwide mainly because of higher death rates for young girls than boys. Higher death rates are symptomatic of the more general pattern of female deprivation in the developing world, especially in South Asia.

- Underinvestment in girls is an economic problem resulting from a vicious cycle caused by distorted incentives. Parents don't invest in their daughters because they expect them to grow up to serve only their husbands; uneducated women have few alternatives, so the expectation becomes self-fulfilling.

- Increasing educational opportunities for girls offers the best chance of breaking this vicious cycle. Considering both private benefits and returns to other family members, it is perhaps the best yielding return of all investments available in developing countries. Among

other things, women spend more of their income on children than their husbands do, and educated women are more likely to seek medical care and to improve sanitation practices. Educated women choose to have fewer children and can provide more for those they do have.

- Giving an extra 100 girls an additional year of education in 1990 would have cost approximately \$30,000. This investment would prevent roughly 60 infant deaths and three maternal deaths — and avert 500 births. Summers concludes that the social benefits alone of increased female education are more than sufficient to cover its costs.

- Programs to increase female education are less expensive than other development investments and could quickly increase female enrollment rates. Priorities should be to reduce the cost of schooling for girls and to make special efforts to accommodate parents's practical needs.

- Major initiatives to increase female education can transform society over time. If more girls had gone to school a generation ago, millions of infant deaths could have been averted each year, and tens of millions of families could have been healthier and happier.

The Policy Research Working Paper Series disseminates the findings of work under way in the Bank. An objective of the series is to get these findings out quickly, even if presentations are less than fully polished. The findings, interpretations, and conclusions in these papers do not necessarily represent official Bank policy.

Investing in *All* the People

by
Lawrence H. Summers

Table of Contents

The Problem of Excess Female Mortality	2
The Vicious Cycle of Deprivation	3
The Need for Education	5
Increasing the Education of Girls	8
What Could Be Accomplished?	10
Conclusion	11
Tables and Figures	12

This paper was prepared for the Quad-i-Azam Lecture at the Eighth Annual General Meeting of the Pakistan Society of Development Economists in Islamabad, Pakistan, in January 1992. The author is grateful to Dennis de Tray, Barbara Herz, Dale Hill, Lant Pritchett, Laura Raney, Sheryl Sandberg, and Kalanidhi Subbarao for valuable discussions and assistance in the preparation of this paper.

I am honored to have the privilege of addressing this distinguished conference. I have read about Pakistan's accomplishments and problems for many years and since coming to the World Bank I have followed your government's bold reform efforts closely. I feel fortunate to finally have the opportunity to visit your country.

I decided to speak today on "Investing In All The People" because an extensive body of recent research has convinced me that once all the benefits are recognized, investment in the education of girls may well be the highest return investment available in the developing world. And, as I will make clear, increasing the education of girls is an especially high priority for Pakistan.

Women's education may seem an odd topic for an economist to address. But enhancing women's contribution to development is as much an economic as a social issue. Economics, with its emphasis on incentives, provides a useful way to understand why so many girls are deprived of education and employment opportunities. And concrete calculations demonstrate that there are enormous economic benefits to investing in women.

In examining the links between women's education and development, I will make five main points that, taken together, provide a compelling case for action.

First, comparisons of the female fraction of the population in different countries suggest that as many as 100 million women are missing worldwide primarily due to higher death rates for young girls than boys. Higher death rates are symptomatic of a much more general pattern of female deprivation in the developing world, especially in South Asia.

Second, underinvestment in girls is not an ineluctable consequence of poverty, nor is it made necessary by any religious or cultural tradition. It is an economic problem that results from a vicious cycle caused by distorted incentives. The expectation that girls will grow to do little other than serve their husbands reduces parent's incentive to invest in their daughter's human capital. Uneducated women then have few alternatives and so the expectation becomes self fulfilling, trapping women in a continuous circle of neglect.

Third, increasing educational opportunities for girls offers the best prospect for cutting into this vicious cycle. As an economic investment, increased outlays directed at educating girls may well yield the highest return of all investments available in developing countries considering both private benefits and returns to other family members.

Fourth, experience suggests that female education programs are relatively inexpensive compared to other development investments and could quickly increase female enrollment rates.

Fifth, major initiatives to increase female education have the potential to transform society over time. If a larger fraction of girls had gone to school a generation ago millions of

infant deaths each year could have been averted and tens of millions of families could have been healthier and happier.

The Problem of Excess Female Mortality

The experience of different countries as reflected in the statistical record provides a natural starting point for any discussion of development policy. I want to start with one of the most basic of all national statistics-- the demographic composition of the population. In examining these statistics, many observers have been struck by the differences between countries in what one might have expected to be a biologically determined constant-- the share of the population that is female. My Harvard colleague Amartya Sen has recently highlighted how large these differences are by calculating that worldwide more than 100 million women ¹ are missing and labelling the fate of these women, "one of the more momentous problems facing the contemporary world." ² This problem is symptomatic of an even larger problem of hidden underinvestment in the human development of the women who survive and are counted.

In the industrialized world females comprise over 51 percent of the population. In Sub-Saharan Africa the percent of the population that is female is a little bit lower, ranging from 50.9 to 49.2 percent (Table 1). Likewise, the percentage of females in Latin America ranges from 50.7 to 49.5 percent. But, as seen in figure 1, Asia in general and Pakistan in particular stand out in any examination of sex ratios. The female share of the population is 48.5 percent in China, 48.1 percent in India, and 47.6 percent in Pakistan-- the lowest measured share in the developing world.

Why are there such large differences in sex ratios across countries? As a matter of logic there are four possibilities-- differences between men and women in migration patterns, differences in the share of female babies born, differences in male and female population shares counted by census data, or differences in female survival rates. There is no evidence that differing patterns of migration between women and men can explain such large differences in national sex ratios, nor are there noticeable differences across countries in the share of female births. ³ Claims that women are undercounted in certain societies are largely unsubstantiated

¹ Ansley Coale (1991), using slightly different assumptions about expected masculinity ratios, calculates that the total number of missing females is approximately 60 million. As Coale says, even this lower independent estimate "confirms the enormity of the social problem."

² Amartya Sen. "Women's Survival as a Development Problem." Comments prepared for the 1700th Stated meeting of the American Academy of Arts and Sciences on March 8, 1989.

³ There is some evidence that in higher income Asian countries modern medical technologies have been used to selectively abort female fetuses. Where selective abortion is not practiced, male births generally slightly outnumber female births. The median ratio of the number of male to female births in 24 countries in Europe from 1962 to 1980 was 1.059, with 71 percent falling between 1.055 and 1.064 (Chahnazarian, 1986).

and fail to explain differences in population ratios in nations of similar culture. It follows that discrepancies in the share of women in the population must be primarily a matter of differences in survival probabilities.

Direct analysis of mortality rates supports the proposition that discrepancies in female population ratios are caused by gender differences in survival probabilities (Table 2). These differences are most pronounced for girls and boys between the ages of 1 and 4. Moreover, these current mortality rates and examination of cohort data ⁴ demonstrate that the present low female population ratios do not reflect excess female mortality that took place in the past but indicate an ongoing problem. The precise mechanisms which cause these discrepancies in mortality rates between boys and girls are not fully understood. But studies have found evidence of differential feeding, additional work burden inside and outside the home, and less attention during illness for girls than for boys. Women also suffer excess mortality due to the risks of childbearing. One third of all deaths among Pakistani women aged 15 to 49 are due to complications of pregnancy. ⁵

Given that women get less than their share of the goods necessary for survival, it is hardly surprising that their treatment falls short in other respects (Table 1). There is a considerable tendency for various indicators of the relative treatment of women to be correlated across countries. I am afraid that Pakistan clearly illustrates this point. It lags badly on almost every indicator. As I have said, Pakistan has the lowest ratio of women to men, and among low income countries, the fifth lowest ratio of female to male primary enrollment, and the seventh lowest female/male ratio in secondary enrollment.

The Vicious Cycle of Deprivation?

Why are girls deprived in so much of the world and what explains the large variations across countries? These questions defy any simple answer. But even a cursory examination of the available information suffices to reject some explanations and to support others. It is a misconception that low female population ratios are an inevitable consequence of poverty. Africa has a far higher fraction of women than South Asia despite the fact that it fares equally poorly on measures of per-capita income and much worse on most other social indicators.

Comparisons between populations also allow us to rule out the notion that low female population ratios are unavoidable due to cultural tradition. It would be foolish to deny that culture has a role in explaining differences in sex ratios; any explanation of differing survival

⁴ Examination of the female population ratios for cohorts in 1951, 1961, and 1972 show near equal increases as the cohort ages from 0-10 years to 10-20 years, indicating consistently higher female mortality.

⁵ Senior Minister Begum Nusrat Bhutto. Inaugural Address. Safe Motherhood South Asia Conference. Lahore, Pakistan. March 1990.

rates for children must consider parents' aspirations for their sons and daughters, which obviously cannot be divorced from culture. Yet large differences in the treatment of girls exist between nations with important cultural similarities. To take just one example, the share of the female population in Indonesia is much closer to the African share than to the Pakistani share. Even within a single country large discrepancies in the ratio of females can exist. The state of Kerala in India, for example, has a proportion of females which is far higher than the nation as a whole.⁶

Whatever its original roots, the problem of excess female mortality today is a consequence of a vicious cycle (depicted in Figure 2) whereby parents fail to invest in their daughters because they do not expect their daughters to be able to make an economic contribution to the family, and the prophecy turns out to be self fulfilling. The nature of this cycle is illustrated by two stories.

Situation A. A poor family has 6 children. The mother never attended school and was married at age 15. She is completely illiterate and cannot do arithmetic well enough to count out change. She stays home, does household chores with her daughters, and works in the fields even though she is 7 months pregnant. Her husband earns most of the family's meager income and decides how it is spent. As he, not his sisters, is expected to support his parents, he recognizes that his economic security depends on his sons' ability to support him in his old age. He insists that the boys go to school while the girls stay home to do chores and take care of the young babies. When his daughter becomes mysteriously ill, he feels he can not afford to go with her for two days to the medical clinic in the city. His wife pleads with him but he will not change his mind, repeating the words "we have to think about our future." The wife finally relents, realizing that he is right. The daughter dies.

Situation B. A poor family has 3 children. The mother went to school for five years and is able to read and do arithmetic well enough to teach school in the village. As her last birth was extremely difficult, she and her husband adopted family planning. This allows her more time and resources to spend on her family; she visits her ill mother often and buys her medicine. She insists that all of her children go to school and practice their reading each night, hoping to expand their horizons. She is especially determined that her middle daughter, who has a remarkable ability to make up stories, continue in school and develop her talent. When the daughter gets sick and does not seem to be getting better, she takes her to the medical clinic. The doctor gives them some ampicillin tablets and instructs the mother to give them to any of the children who fall ill. The daughter's strep infection is cured, as is the infection of the son who was running a high fever by the time the mother returned home.

⁶ This difference may be partially due to migration. But this is unlikely to be the whole story. It is noteworthy that Kerala's health and primary education systems are very strong, both overall and in their treatment of girls and women.

Some of the differences between these two situations are obvious enough. An uneducated mother without skills that are valued outside the home has less ability to influence choices within the family. Her daughters are uneducated as well and a vicious cycle is perpetuated-- girls grow up only to marry into somebody else's family and bear children. Girls are thus less valuable than boys and are kept at home to do chores while their brothers are sent to school. They remain uneducated and unskilled and the conditions necessary for them to contribute to the economy are not created. The economy suffers and young girls die of neglect.

By contrast, an educated mother faces a higher opportunity cost of time spent caring for children. She has a greater value outside the home and thus has an entirely different set of choices than she would without education. She is married at a later age (Figure 3) and is able to better influence family decisions. She has fewer, healthier children and can insist on the development of all of them, ensuring that her daughters are given a fair chance. And the education of her daughters makes it much more likely that the next generation of girls, as well as of boys, will be educated and healthy as well. The vicious cycle is thus transformed into a virtuous circle.

The Need for Education

What is the best way to convert what is too often a vicious cycle into a virtuous circle? There is no one answer to this question. But I believe that the available evidence suggests that programs to raise the education of girls offer the best hope. When one takes into account all of its benefits, educating girls quite possibly yields a higher rate of return than any other investment available in the developing world. Consider its benefits.

Most obviously, there is the direct effect of increased female education on the wages of female workers. The evidence is that the returns in the form of higher wages are fairly similar for men and women. As a rough approximation, wages increase by more than 10 to 20 percent for each additional year of schooling. In parts of the world like South Asia and Africa, where literacy and school enrollment rates are low, the returns to education are particularly high.

Returns of this magnitude are impressive by the standard of other available investments, but they are just the beginning of the benefits from increasing female education. In part because of what women do with the extra income they earn, in part because of the extra leverage it affords them within the family, and in part because of the direct effects of being more knowledgeable and aware, female education has an enormous impact on health practices including adoption of family planning-- an impact that as Table 3 demonstrates, is large enough to justify increased educational outlays even if there were no direct pecuniary benefits. While the evidence is that increased schooling of boys and girls is similar in its wage impact, it is clear that educating girls is much more effective in generating social benefits.

Educating women yields high returns in terms of healthier children by cutting through the vicious cycle I just described. There is overwhelming evidence that mothers channel much

more of their income to expenditures on children than their husbands do. But this is only one of the channels through which education improves health. It also increases the willingness to seek medical care and improves sanitation practices. Educating an extra 1000 girls an additional year in 1990 would have cost approximately \$30,000.⁷ The best available estimates suggest that each year of schooling reduces under five mortality by up to 10 percent. Similar estimates are obtained both from studies of cross sections in individual countries and for studies of cross country variations in infant and child mortality rates. With an average woman in Pakistan having 6.6 children, it follows that providing an additional 1000 women one extra year of schooling would prevent roughly 60 infant deaths.

What would it cost to achieve similar results through investments in health care? Obviously the answer differs across health care investments. For example, cost effectiveness estimates suggest that programs of supplementary antenatal feeding cost in the neighborhood of \$700 per life saved. Other commonly recommended health interventions are more expensive; measles immunization programs outside of high risk environments, for example, cost \$1000 per life saved.⁸ Taking \$800 as the cost of saving a life with health care interventions, the cost of achieving the same reduction in mortality that would accrue from devoting \$30,000 to educating another 1000 girls is \$48,000. As this calculation ignores any other benefits of reduced child morbidity, it underestimates the returns to female education as a health care investment.

Educated women also choose to have fewer children. Econometric studies within individual countries looking at the effects of education on fertility find that an extra year of female schooling reduces female fertility by approximately 5 to 10 percent, or in the case of Pakistan by about .7.⁹ Thus a \$30,000 investment in educating 1000 women would avert 500

⁷ The World Bank's best estimate of the average recurrent cost of one year of secondary school in Pakistan is \$28.7. On the one hand, the marginal cost will be higher for girls. On the other hand, primary school is cheaper than secondary school so our use of \$30 as the recurrent costs of one year of school is conservative.

⁸ Jamison and Mosley's study, described in Chapter 1 of Disease Control Priorities in Developing Countries (1990), gives costs for a wide variety of health interventions. The cost of supplementary antenatal feeding per discounted healthy life year gained is \$25. The cost of measles immunization per discounted healthy life year gained outside of high risk environments is \$40. The cost of immunization for tuberculosis and leprosy per discounted healthy life year gained is \$75. The cost of improved cholera immunization per discounted healthy life year gained is \$200.

⁹ A study by Dennis de Tray (1972) finds the elasticity of fertility with respect to female education is -0.3. At a level of three years of schooling an additional year would reduce fertility by 10%. Other more recent studies confirm this magnitude. In Kenya (Schafgans, 1991) a woman with secondary education has one fewer child than a woman with five to eight years of

births. I will avoid the metaphysical question of trying to value an averted birth and simply ask how much typical family planning programs spend per birth that they avert. A typical family planning evaluation concludes that costs run approximately \$65 per birth averted. Averting 500 births would cost about \$33,000, enough to justify education on family planning grounds alone.¹⁰

There is a final group of beneficiaries of investments in female education-- the women themselves. Maternal mortality rates are ten times as high in South Asia as in East Asia. By increasing knowledge about health care practices and reducing the average pregnancies of these women, female education significantly reduces the risk of maternal mortality (Figure 4). Based only on the impact on the number of births, and not including what are surely significant impacts on the risks associated with any given birth, one can calculate that an additional year of schooling for 1000 women will prevent three maternal deaths. Achieving similar gains in adult mortality through medical interventions of average cost effectiveness would cost close to \$7,500.¹¹

These estimates of the social benefits are of course crude. On one hand, I have failed to discount benefits to reflect the fact that female education operates with a lag. On the other hand, I have neglected the add-on benefits as healthier better educated mothers not only have healthier better educated children but healthier better educated grandchildren. When the average mother has nearly 40 grandchildren as in Pakistan, this is no small thing.

Even discounting the social benefits of education to reflect the lags and taking no account of add-on benefits, the social benefits of increased female education are sufficient to more than cover its costs. Given that increases in female education also yield large wage increases, it seems reasonable to conclude that the return to getting more girls into school is in excess of 20 percent and may well be considerably greater. Turning the vicious cycle I have described into a virtuous circle has other benefits as well. It provides more women the means to escape the exploitation and neglect that remains all too common in many parts of the world and it helps them to become dignified members of their family, their society, and their nation. I will come later to the comparison of the return to educating girls with other developmental expenditures. But let me just note for now that the calculations I have just presented imply that educating girls looks quite attractive compared with educating boys and quite likely has higher returns than health or family planning interventions.

schooling. In Peru (Herz and Khandker, 1991) an additional year of schooling reduced urban women's number of offspring by roughly 0.26 (6.7% of the country's mean fertility rate of 3.9). In Thailand (Schultz, 1991) an additional year of schooling reduced fertility by 7 to 9%

¹⁰ Of course family planning is also useful in promoting women's and children's health and preventing primitive abortion with its high risks of morbidity and mortality.

¹¹ The cost of integrated antenatal and delivery care for maternal mortality per discounted healthy life year gained is \$150 (Jamison and Mosley, 1990).

Increasing the education of girls

There is then an overwhelming case for increased investments in the education of girls. How can this best be done? The first component of any effort to raise female enrollment rates must be policies that promote economic growth and poverty alleviation. Comparisons of both countries and families demonstrate a strong impact of poverty alleviation on enrollment rates. Because parents are more reluctant to send girls than boys to school, poverty alleviation is especially important for raising female enrollment rates.

But female enrollments do not always rise as incomes grow. It takes the right policies to alter perverse incentives and provide the needed encouragement to let girls learn.

Ultimately, whatever laws legislatures enact, it is parents who decide whether or not to send their daughters to school. And although the social returns to educating girls far exceed the returns to educating boys, parents capture a larger fraction of the benefits of educating their sons. In a survey done some years ago, by far the largest single reason given by parents (over 45%) for not educating daughters was lack of financial gain to the family (Table 4).

What can be done to make educating girls more attractive to parents? While the evidence is far from clear and there is a need for controlled experiments, current knowledge suggests enactment of an agenda which will recognize the external benefits of female education in determining financing policies and would seek to make educating girls more attractive given both cultural traditions and the many competing needs of poor families. As there are greater social benefits to educating girls than boys, it is appropriate for females' education to cost less than male education. Scholarship funds should be established and more free books and other supplies provided for girls. Because parents are more reluctant to educate their daughters, this is particularly important. One study in Peru found that rules requiring students to pay for textbooks had a large negative effect on female enrollment but almost no effect on males. Whatever the general merits of cost recovery in the case of basic education may be, the argument is much weaker where there are large external benefits, as there are with the education of females.

Providing schooling that responds to cultural and practical concerns is also essential. Female enrollment is heavily dependent upon schools not being too far away, upon the provision of appropriate sanitation facilities, and upon the hiring of female teachers. This, of course, is facilitated by raising female enrollment rates. Flexible hours and the provision of care for younger siblings can also be helpful in some cases.

These two measures-- reducing costs for girls and making special efforts to accommodate parents' practical needs-- will make a big difference in raising families' demand for female education. In the survey cited above, the largest single reason given by girls for their lack of enrollment was "there is no school for girls" (Table 5). A recent survey of households in four Pakistani districts shows that enrollment rates for girls with a school in their village is equivalent to male enrollment (Table 6). The enrollment rate of girls with a school nearby, instead of in

their village, is ninety percent of that of males. This indicates that increasing the supply of educational facilities for girls has tremendous potential for expanding enrollment.

Increasing female enrollment in school is dependent upon providing resources for increased schooling. As education is a labor intensive business, it is relatively inexpensive to provide in low income countries. The available statistics indicate that in low income economies, the average annual recurrent costs of primary schooling (which comprise the vast majority of the costs) run slightly over \$36 per student. Secondary education is somewhat more expensive per student, reflecting in part lower enrollment rates. Since satisfactory estimates of the average cost of secondary school are not available, I simply assume that they are twice primary costs.¹²

* Raising the female primary school enrollment rate of girls to equal the male primary school enrollment rate in the world's low income countries would involve educating an additional 25 million girls each year at a total cost of approximately \$938 million (Table 7). Raising the secondary school enrollment of girls to equal the secondary school enrollment rate of boys would involve educating an additional 21 million girls at a total cost of \$1.4 billion. Eliminating educational discrimination in the low income parts of the world would thus cost a total of \$2.4 billion. This represents less than one-quarter of one percent of their GDP, less than two percent of their government consumption spending, less than one percent of their investment in new capital goods, and less than 1/10 of their defense spending.

* Similar calculations can be made for Pakistan. The recurrent costs of raising female primary enrollment to equal the current primary enrollment of males would be about \$36 million or 625 million rupees. This represents only 0.12 percent of GNP. Achieving the more ambitious objective of equalizing male and female enrollment rates in both primary and secondary school would cost \$64 million, 1.1 billion rupees or .22 percent of GDP. Of course these low costs will not meet all of Pakistan's educational goals. Maintaining and raising the current low overall enrollment rates with existing population growth will not be cheap and will require major investments.

Considering the very low cost both in Pakistan and in low income countries in general of equalizing educational opportunities for men and women, it is easier to wonder whether the world can afford not to make the necessary outlays than it is to wonder if they are affordable. I have already suggested that education looks very attractive relative to other social sector investments. When compared to development investments outside the social sector, education looks even more attractive. Taking investments in power generation as an example, current projections suggest that developing countries will spend approximately \$1 trillion on power

¹² This assumption overstates the cost of secondary education Pakistan and understates the cost in some other parts of the world, particularly where foreigners are hired to teach secondary school. For Pakistan, we have rough estimates and hence we use \$30 as the recurrent cost of one year of secondary school.

plants over the next ten years. In many of these nations, existing power plant capacity utilization is less than 50 percent due to poor maintenance and pricing problems. The overall return on power plant physical assets in a sample of 57 developing countries has been estimated at an average of less than 4 percent over the last 3 years and less than 6 percent over the last decade, returns which can not even compare with those of providing education for females.

No doubt efficiency in the power sectors of developing countries can and will be improved. And I have probably understated somewhat the difficulty of raising enrollment rates by neglecting capital costs and not taking explicit account of the special costs that must be incurred in targeting girls. Nonetheless, it is hard to believe that building 19 out of every 20 planned power plants and using the savings to finance world equal educational opportunity for girls would not be desirable.

What Could Be Accomplished?

Letting girls go to school, learn to read, and experience more of the world beyond their homes makes them better off immediately and enriches their families. Over time, getting girls into school can transform societies as their sons and daughters and grandsons and granddaughters reap the benefits. Contemplate a very crude estimate of how much better off the world would be today if major investments in increasing female education had been made a generation ago.

There are a number of different strategies to approaching this counterfactual. One method would be to simply extrapolate the calculations based on microeconomic estimates based on surveys of women within individual countries. Instead, as a kind of check on those calculations, I examine the relationship between national rates of infant mortality and female education a generation ago (Table 8 and Figures 5 and 6), holding constant a variety of country characteristics. The estimates are derived from a sample of the 45 developing countries for which all the needed data are available. As the evidence I have presented so far might lead one to expect, the relationship is both statistically significant and implies large effects of education on health and fertility. Female education rates are the most potent variable in these equations, dwarfing the effects of male education or the availability of medical care.

These relationships can be used to simulate the impact of an increase in the female secondary school enrollment rate from its average in 1965 to 30 percent (Table 9). For comparison, the male secondary enrollment rate in this sample of countries averaged 22 percent in 1965. The results are striking. In Pakistan alone raising the female secondary enrollment rate from 6 to 30 percent in 1965 would have averted 1.2 million births per year and 297 thousand infant deaths. For a sample of 45 countries that includes about 71 percent of the low income world's population (excluding China), the result would be 9.1 million births per year averted and 3.0 million fewer infant deaths.

Conclusion

My emphasis this afternoon is on the need for increasing expenditures on female education. Those who advocate such policies also argue for programs directed at enhancing family planning and women's health services as well as measures to combat discrimination in labor and credit markets. I have little doubt that such actions would also be constructive, but I believe that they are less important than improvements in female education. Hard statistical evaluations fairly consistently find that female education is the variable most highly correlated with improvements in social indicators. And the benefits of education have multiplier effects because they empower women to bring about other necessary changes. The greatest emphasis, therefore, should be put on closing the education gaps that I have described.

Lectures and papers that plead the importance of a particular type of investment in developing countries are hardly uncommon. Reflecting the biases of an economist, I have tried to concentrate on the concrete benefits of female education and explicitly contrast it with other proposed investments. Expenditures on increasing the education of girls do not just meet the seemingly easy test of being more socially productive than military outlays. They appear to be far more productive than other social sector outlays and than the vastly larger physical capital outlays that are projected over the next decade.

In making an economic argument for investing in the education of women, I have tried to steer clear of the moral and cultural aspects unavoidably implicated in any gender related question. Partially this reflects my comparative advantage as an economist. But it also reflects a conviction that one's viewpoint on feminism should not affect one's evaluation of the arguments for educating girls. Helping women be better mothers to their children is desirable on any view of the proper role of women in society.

There are those who say that educating girls is a strategy that pays off only in the long run. I am reminded of a story that John F. Kennedy used to tell of a man asking his gardener how long it would take for a certain seed to grow into a tree. The gardener said it would take 100 years, to which the man replied, "Then plant the seed this morning. There is no time to lose."

TABLE 1: Selected statistics on women's role

Regions	GNP per Capita 1989	Fem. % of Total Popul- ation	Fem. as % of pop- ulation age 0-4	Life Expectancy			Primary Enroll.		Secondary Enroll.		Fertility	Age Marriage
				F	Ratio F/M	Maternal Mortality	F	Ratio F/M	F	Ratio F/M		

Low-income	330	49.0%	48.5%	63	1.03		95		29		4	
w/o China & India	300	50.0%	49.2%	56	1.04		68		20		5.6	
Low-and-middle income	800	49.2%	48.7%	65	1.05		97		36		4	
High income	1730	51.0%	48.7%	79	1.08		102		94		1.8	
Low income countries:												
<u>Asia</u>												
Bangladesh	180	48.5%	48.5%	51	0.98	600	49	0.64	11	0.46	5.5	20
China	350	48.5%	48.2%	71	1.03	44	126	0.90	37	0.74	2.4	22.4
India	340	48.2%	48.5%	59	1.02	500	83	0.73	29	0.58	4.3	18.7
Indonesia	500	50.2%	49.2%	63	1.05	800	117	0.98	43	0.81	3.5	20
LaoPDR	180	49.7%	49.5%	51	1.06		98	0.96	22	0.96	5.7	16.7
Nepal	180	48.7%	48.5%	51	0.98		57	0.55	17	0.49	5.9	17.9
Pakistan	370	47.6%	48.7%	55	1.00	600	28	0.55	11	0.42	6.7	19.8
Sri Lanka	430	49.5%	49.0%	73	1.06	90	105	1.00	74	1.17	2.7	24.4
<u>Latin America</u>												
Haiti	360	51.0%	49.5%	57	1.06	340	80	0.96	17	0.89	4.7	23.8
<u>SS Africa</u>												
Benin	380	51.0%	50.0%	53	1.08	1680	43	0.51	9	0.39	6.5	18.3
Burkina Faso	320	50.5%	50.0%	49	1.07	600	24	0.59	4	0.50	6.5	17.4
Central Africa Rep.	390	51.5%	50.0%	52	1.06	600	51	0.62	6	0.35	5.8	
Chad	190	50.7%	50.0%	48	1.07	700	29	0.40	2	0.20	5.9	
Ethiopia	120	50.2%	50.0%	49	1.07	2000	28	0.61	12	0.67	6.5	17.7
Ghana	390	50.5%	49.7%	56	1.06	1070	66	0.85	30	0.61	6.4	19.3
Kenya	360	50.0%	49.5%	61	1.07	510	91	0.93	19	0.70	7.7	20.4
Lesotho	470	51.9%	50.5%	58	1.07		123	1.21	30	1.67	5.8	20.5
Madagascar	230	50.5%	49.7%	52	1.04	300	95	0.98	19	0.83	6.4	20.3
Malawi	180	51.0%	49.5%	48	1.02	250	65	0.89	3	0.60	7.6	17.8
Mali	270	51.7%	50.0%	49	1.07		17	0.59	4	0.44	7	18.1
Mozambique	80	50.7%	50.0%	50	1.06	479	59	0.78	4	0.57	6.3	17.6
Niger	290	50.5%	50.0%	47	1.09	420	21	0.57	4	0.44	7	
Nigeria	250	50.5%	49.7%	54	1.10	1500	48	0.67	7	0.24	6.5	18.7
Sierra Leone	220	51.0%	50.0%	44	1.10	450	40	0.59			6.5	
Somalia	170	52.4%	50.0%	49	1.07	1100	13				6.8	20.1
Tanzania	130	-----	-----	51	1.09	370	66	0.99	3	0.60		
Togo	390	50.7%	49.7%	55	1.06	476	78	0.63	12	0.33	6.5	
Uganda	250	50.5%	49.7%	50	1.06	300	50	0.66	8	0.50	6.9	
Zaire	260	50.7%	49.7%	54	1.06	800	65	0.76	14	0.44	6.1	20.1
Zambia	390	50.7%	49.5%	56	1.08	110	92	0.90			6.8	19.4

TABLE 2**Comparison of the Ratio of Female to Male Age-specific Mortality Rates**

AGE	0-1	1-4
PAKISTAN	0.89	1.26
BANGLADESH	0.93	1.12
SYRIA	0.95	1.04
ALGERIA	0.91	1.02
MALAYSIA	0.83	1.00
MALI	0.81	0.94
COLUMBIA	0.80	0.91
PHILLIPINES	0.74	0.90
BOLIVIA	0.86	0.90
MALAWI	0.85	0.89
JORDAN	0.87	0.83
SINGAPORE	0.74	0.80
MAURITIUS	0.66	0.58

Source: United Nations Demographic Yearbook, 1988

TABLE 3

Net Social Benefits of One Additional Year Schooling for 1,000 Women

Recurrent cost of one year education for 1000 women	\$30,000
<u>Child Mortality</u>	
Percentage reduction in child (<5) mortality	7.5
Total fertility rate in Pakistan	6.6
Total averted deaths per 1,000 women	60
Alternative costs per averted deaths	\$ 800
Value of averted deaths	\$48,000
<u>Births Averted</u>	
Percentage of reduction in total fertility rate	7.5
Births averted	500
Alternative cost per birth averted	\$ 65
Value of averted births	\$33,000
<u>Maternal Mortality</u>	
Maternal mortality per 100,000 births	600
Mother's death's averted	3
Alternative cost per averted maternal deaths	\$ 2500
Value of averted maternal deaths	\$7,500
Total discounted social benefits (15 years, 5%)	\$42,600

TABLE 4

Responses to the Question 'If Boys and Girls are equal in the eyes of Parents, why do most of the Parents educate their Sons and not the Daughters?'

RESPONSE	No.	%
1. There are no financial gains to the parents.	716	45.2
2. It is not customary to educate girls.	256	16.2
3. There is no proper arrangement for girls education.	209	13.2
4. Since boys and girls are not equal, there is no question of educating both.	133	8.4
5. Poverty prevents parents from educating daughters.	74	4.7
6. Girls become too independent after getting educated.	58	3.7
7. Ignorant parents do not value their children's education.	49	3.1
8. Purdah is the reason for not educating girls.	44	2.8
9. Girls have to do household work.	18	1.1
10. Girls are not intellectually capable of getting an education.	16	1.0
11. Education does not help girls in their future life.	12	0.8
	1,585	100.0

Source: Nasra M. Shah Pakistani Women: A Socioeconomic & Demographic Profile. Pakistan Institute of Development Economics. Islamabad, 1986.

TABLE 5

Reasons why the Girls thought they were not in School

Reason	No.	%
1. There is no school for girls.	85	33.0
2. The relatives are against my education.	57	22.1
3. Poverty is the reason for not educating me.	47	18.2
4. I am not good enough for study.	26	10.1
5. They do not send me to school because of work at home.	22	8.4
6. There is no teacher in school.	12	4.7
7. The teacher does not treat me well.	9	3.5
	258	100.0

Source: Nasra M. Shah Pakistani Women: A Socioeconomic & Demographic Profile.
Pakistan Institute of Development Economics. Islamabad, 1986.

TABLE 6
Proportion of Respondents Attending School

AGE COHORT	SCHOOL IN VILLAGE		SCHOOL NEARBY	
	M	F	M	F
10-14	93.1	97.8	71.8	66.1
20-24	100.0*	---**	67.2	43.2
30-44	43.8	---***	52.2	32.3

Source: Prepared from "The Gender Gap in Cognitive Skills in a Poor Rural Economy" by Harold Alderman, Jere R. Behrman, David R. Ross, and Richard Sabot.

* 12 respondents.

** All 7 respondents attended school.

*** Both respondents attended school.

TABLE 7

Cost of Raising Female Enrollment Sufficiently to:

A
Equalize
Female/Male Enrollment

B
Raise female enrollment
to level in high income
Ratio countries

	Number Students (Millions)	Cost (Millions)	Number Students (Millions)	Cost (Millions)
<u>Primary</u>				
Low Income	25	938	9	328
Low Income (w/o India, China)	6	230	14	560
Pakistan	1.8	36	5.8	115
<u>Secondary</u>				
Low Income	21	1,201	98	5,329
Low Income (w/o India, China)	5	271	38	2,203
Pakistan	.9	28	5.2	157

Table 8: Cross-country Regression Results for LDCs (N=45) –
Determinants of TFR, IMR & Female Secondary Enrollment, 1987

	Dependent variables:		
	TFR	IMR	FEMSEC
constant	7.09 (9.83)***	125.417 (6.508)***	-0.666 (-0.182)
Female Secondary Gross Enrol. Rate, 1965	-0.389 (-3.592)***	-5.967 (-2.414)**	1.786 (1.999)**
Female Secondary Gross Enrol. Rate^2	0.016 (3.526)***	0.139 (1.293)	-0.00607 (-0.155)
Female Secondary Gross Enrol. Rate^3	-0.0002 (-3.937)***	-0.00129 (-0.940)	-0.0003 (-0.567)
Male Secondary Gross Enrol. Rate 1965	0.0837 (0.720)	-0.565 (-0.235)	-0.739 (-0.891)
Male Secondary Gross Enrol. Rate^2	-0.006 (-1.339)	0.0588 (0.630)	0.031 (0.891)
Male Secondary Gross Enrol. Rate^3	0.0001 (2.078)**	-0.00074 (-0.692)	-0.00027 (-0.673)
% Population w/ Access to Water		-0.442 (-1.866)*	
Population per Physician	0.0000026 (0.161)	0.00082 (1.924)*	
Urban Population as % of Total Pop.	0.014 (1.120)	0.539 (2.564)**	0.296 (2.791)***
Gross National Income Per Capita, 1987	-0.00069 (-2.428)**	-0.012 (-2.407)**	0.0024 (1.120)
Expend. on Education as % of GNP, 1985			1.769 (2.976)***
adjusted R2	0.66	0.74	0.88

* significant at the 10% level

** significant at the 5% level

*** significant at the 1% level

(standard errors corrected for heteroskedasticity)

Source: K. Subbarao and L. Raney "Social Gains from Female Education,
PHRWD, forthcoming.

Table 9: The Long Run Impact of Improved Female Education/a

	Births per year, 1987 (millions)			Deaths per year, 1987 (millions)		
	Actual	Simulated	Averted	Actual	Simulated	Averted
45 low and middle income countries/b	62.3	53.2	9.1 15%	4.9	1.9	3.0 61%
16 low income countries/c	41.7	34.3	7.4 18%	3.8	1.5	2.3 61%
Pakistan	4.1	2.9	1.2 30%	0.4	0.1	0.3 75%

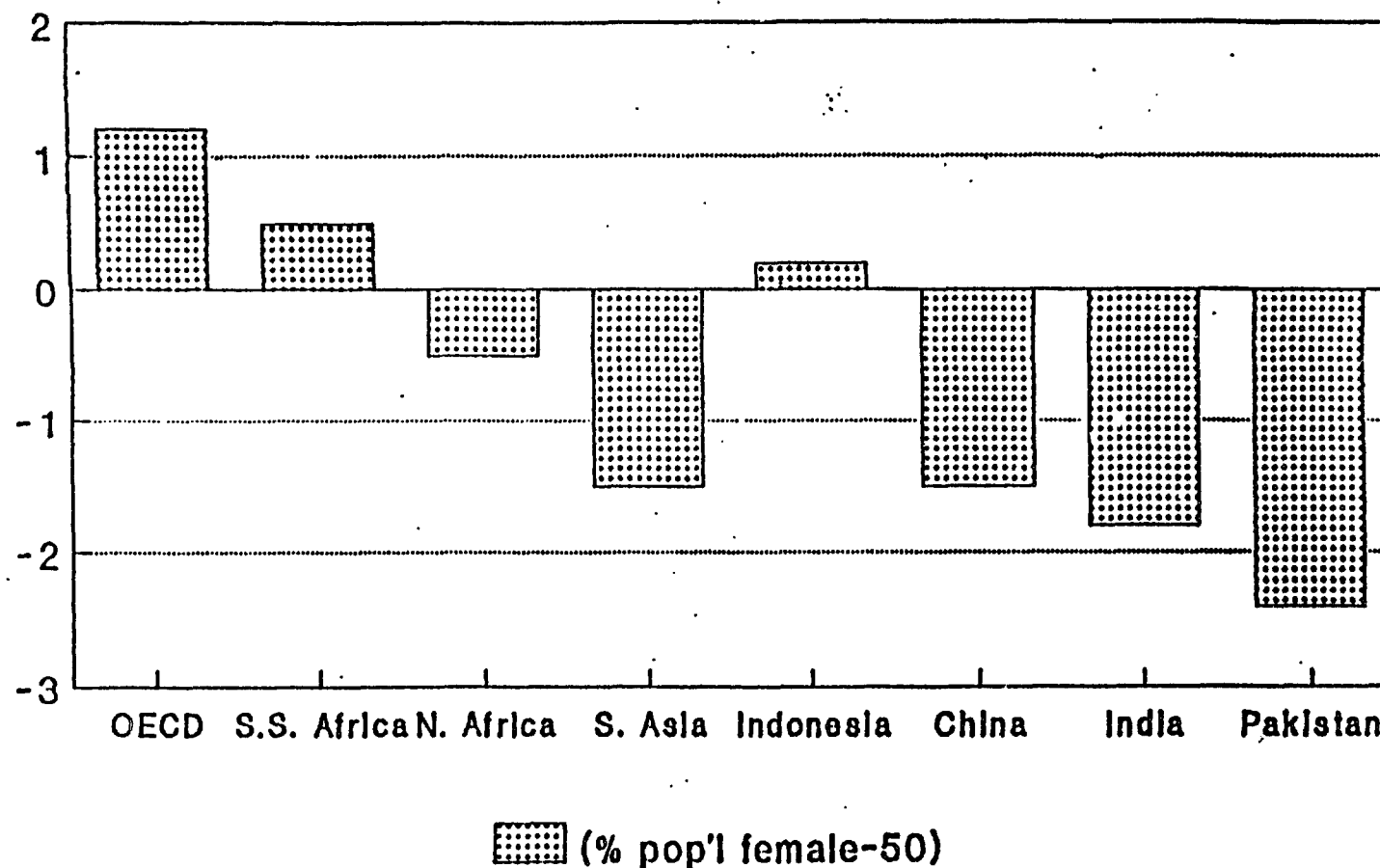
a/Simulation depicts the scenerio if the female gross secondary enrollment rate in 1965 were raised to 30%

b/These 45 countries represent 55 percent of the world population, and 71 percent of the LDC population, excluding China

c/These 16 countries represent 35 percent of the world population, and 70 percent of the low-income LDC population excluding China

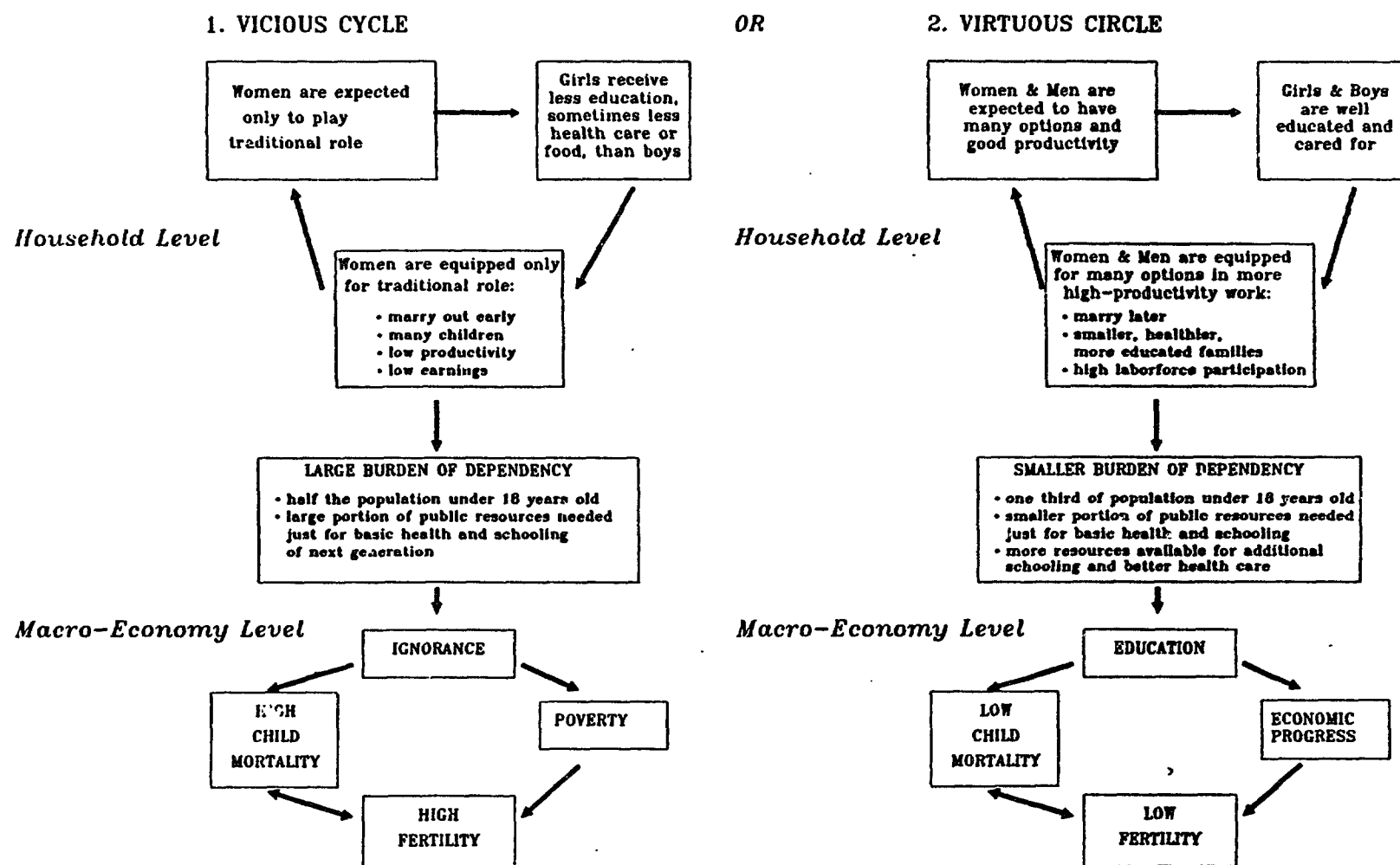
Source: K. Subbarao and L. Raney, "Social Gains from Female Education," PHRWD, forthcoming.

Figure 1: Female population, %
(deviations from 50%)



Source, World Development Report, 1989

Figure 2: Educating Girls and Economic Development



Source: Herz et al. 1991. "Letting Girls Learn." World Bank Discussion Paper 133.

Figure 3: Female Education and Age at Marriage
(partial correlation, controlling for GDP per capita)

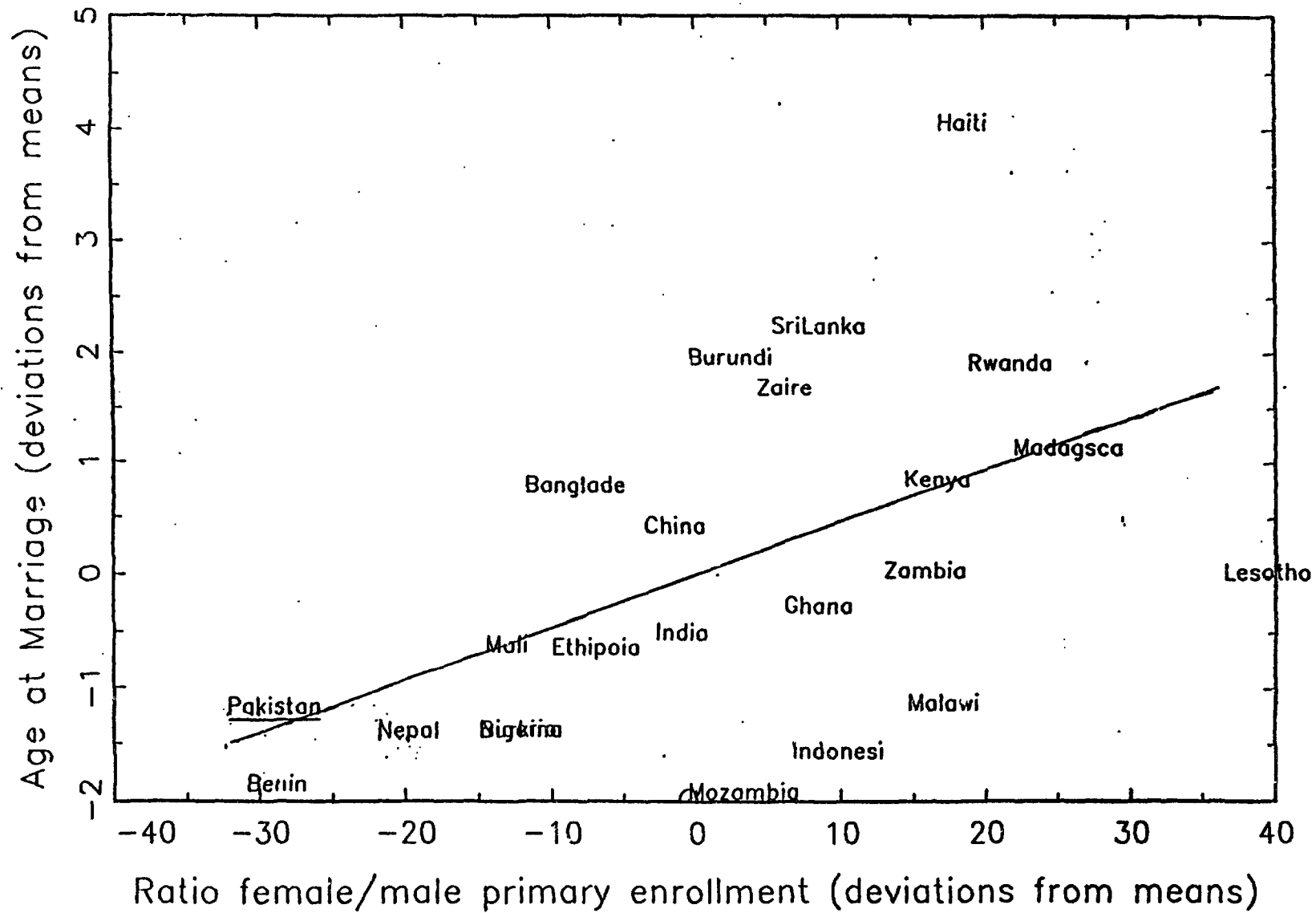


Figure 4: Female Education and Maternal Mortality
(partial correlation, controlling for GDP per capita)

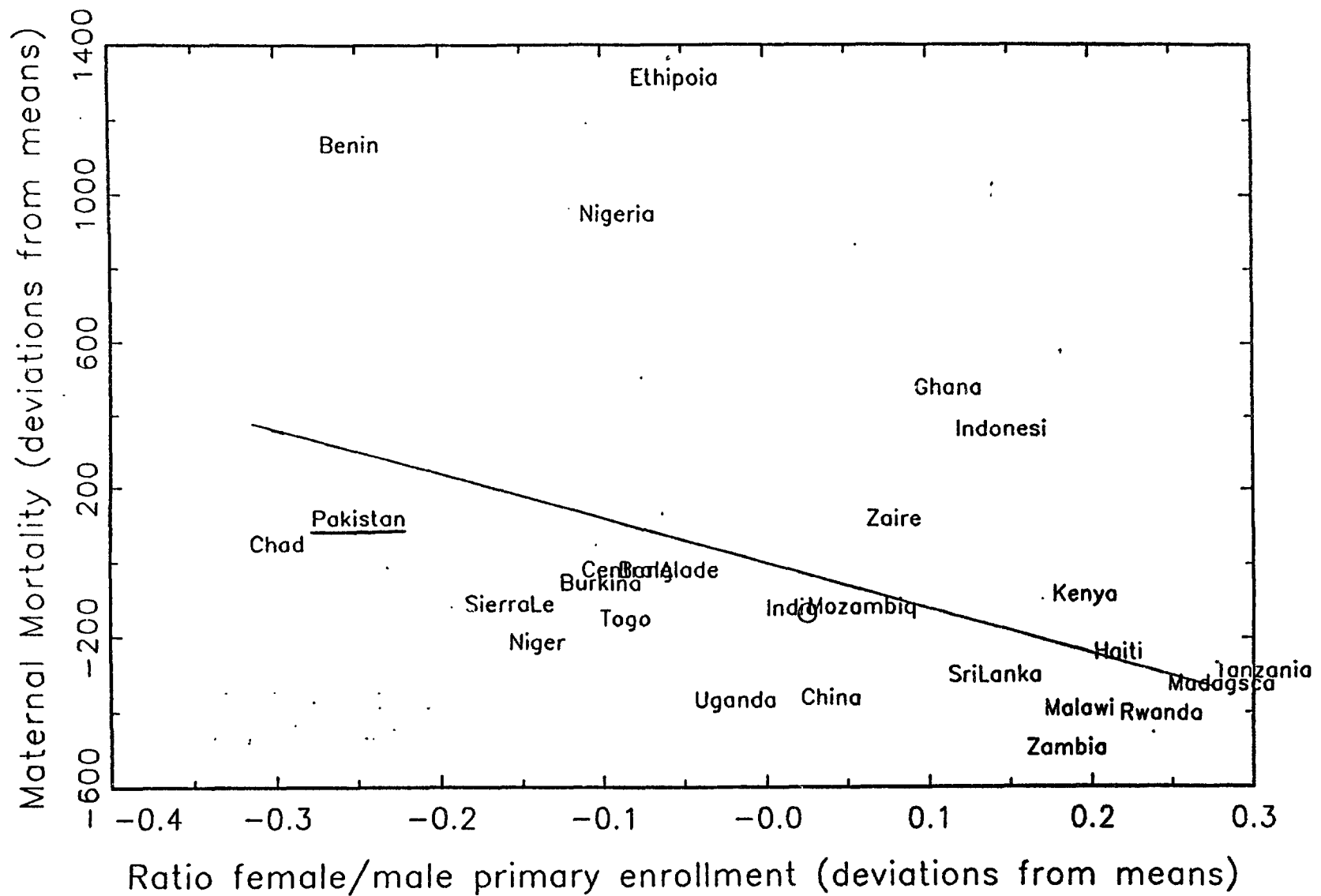
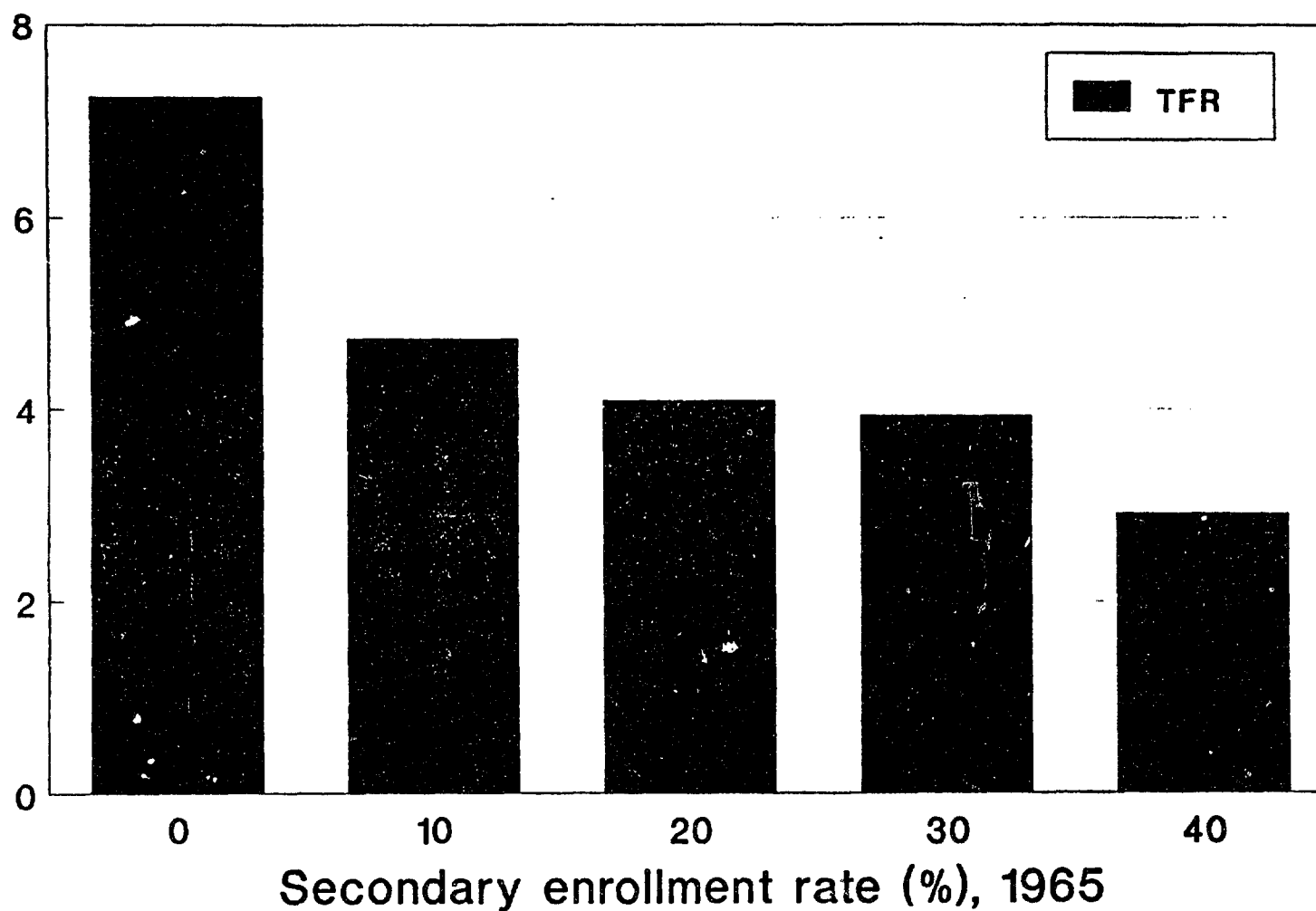
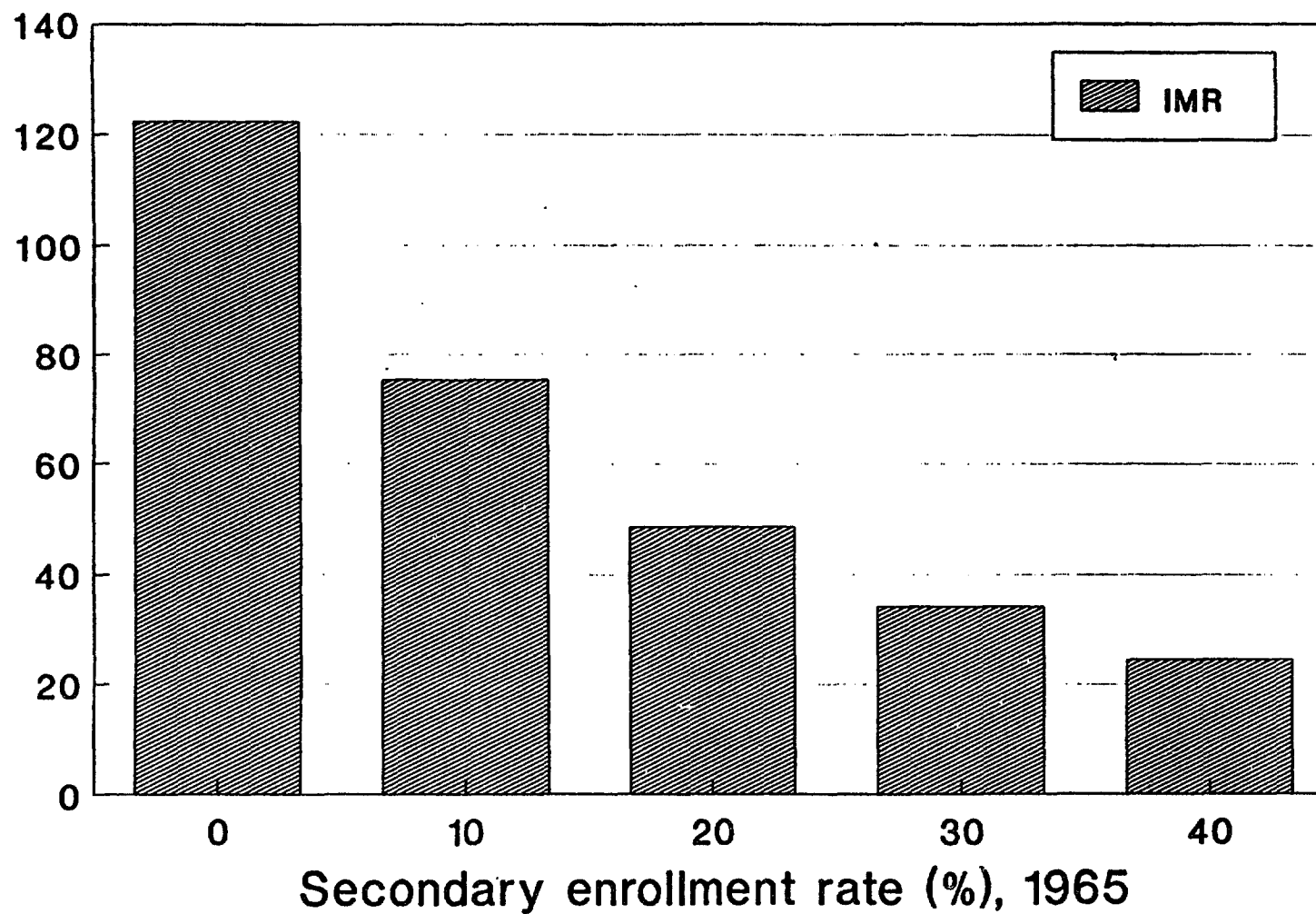


Figure 5: Predicted TFR, 1987
births per woman enrolled in 1965



Note: results based on regressions controlling for spouse effect (all LDCs, n=45)
Source: Subbarao and Raney, "Social Gains from Female Education," forthcoming, PHRWD

**Figure 6: Predicted IMR, 1987
for 1000 women enrolled in 1965**



Note: results based on regressions controlling for spouse effect (all LDCs, n=45)
Source: Subbarao & Raney, "Social Gains from Female Education," forthcoming, PHRWD

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS880	Exchange Rate Policy, the Real Exchange Rate, and Inflation: Lessons from Latin America	Miguel A. Kiguel	April 1992	R. Luz 34303
WPS881	Dual and Multiple Exchange Rate Systems in Developing Countries: Some Empirical Evidence	Nita Ghei Miguel A. Kiguel	April 1992	R. Luz 34303
WPS882	Issues in Reforming Financial Systems in Eastern Europe: The Case of Bulgaria	Alfredo Thorne	April 1992	L. Ly 37352
WPS883	Malaria: The Impact of Treated Bed-Nets on Childhood Mortality in the Gambia	Pedro L. Alonso Allan G. Hill Patricia H. David Greg Fegan Joanna R. M. Armstrong Andreas Francisco K. Cham Brian M. Greenwood	April 1992	O. Nadora 31091
WPS884	Intercommodity Price Transmittal: Analysis of Food Markets in Ghana	Harold Alderman	April 1992	C. Spooner 30464
WPS885	The Impact of EC-92 on Developing Countries' Trade: A Dissenting View	A. J. Hughes Hallett	April 1992	A. Kitson-Walters 33712
WPS886	Factors That Affect Short-Term Commercial Bank Lending to Developing Countries	Sudarshan Gooptu Maria Soledad Martinez Peria	April 1992	L. Dionne 31426
WPS887	Power Sharing and Pollution Control: Coordinating Policies Among Levels of Government	William Jack	April 1992	P. Pender 37851
WPS888	Transformation of Agriculture in Central Eastern Europe and the Former USSR: Major Policy Issues and Perspectives	Csaba Csáki	April 1992	C. Spooner 30464
WPS889	On-the-Job Improvements in Teacher Competence: Policy Options and Their Effects on Teaching and Learning in Thailand	Stephen W. Raudenbush Suwanna Eamsukawat Ikechuku Di-Ibor Mohamed Kamali Wimol Taoklam	April 1992	C. Cristobal 33640
WPS890	Population, Health, and Nutrition: Fiscal 1991 Sector Review	Denise Vaillancourt Janet Nassim Stacye Brown	April 1992	O. Nadora 31091

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS891	Public Institutions and Private Transactions: The Legal and Regulatory Environment for Business Transactions in Brazil and Chile	Andrew Stone Brian Levy Ricardo Paredes	April 1992	G. Oriaca-Tetteh 37646
WPS892	Evaluating the Asset-Based Minimum Tax on Corporations: An Option-Pricing Approach	Antonio Estache Sweder van Wijnbergen	April 1992	A. Estache 81442
WPS893	The Evolving Legal Framework for Private Sector Activity in Slovenia	Cheryl W. Gray Franjo D. Stiblar		
WPS894	Social Indicators and Productivity Convergence in Developing Countries	Gregory Ingram	April 1992	J. Ponchamni 31022
WPS895	How Can Debt Swaps Be Used for Development?	Mohua Mukherjee	April 1992	Y. Arellano 31379
WPS896	Achievement Evaluation of Colombia's <i>Escuela Nueva</i> : Is Multigrade the Answer?	George Psacharopoulos Carlos Rojas Eduardo Velez	April 1992	L. Longo 39244
WPS897	Unemployment Insurance for Developing Countries	Daniel S. Hamermesh	May 1992	S. Khan 33651
WPS898	Reforming Finance in Transitional Socialist Economies: Avoiding the Path from Shell Money to Shell Games	Gerard Caprio, Jr. Ross Levine	April 1992	W. Pitayatonakarn 37664
WPS899	The Financing of Small Firms in Germany	Christian Harm	May 1992	W. Pitayatonakarn 37664
WPS900	The Relationship between German Banks and Large German Firms	Christian Harm	May 1992	W. Pitayatonakarn 37664
WPS901	Opening the Capital Account: A Survey of Issues and Results	James A. Hanson	May 1992	D. Bouvet 35285
WPS902	Public Sector "Debt Distress" in Argentina, 1988-89	Paul Beckerman	May 1992	A. Blackhurst 37897
WPS903	The Economic Effects of Minimum Import Prices (With An Application to Uruguay)	Federico Changanahui Patrick Messerlin	May 1992	D. Ballantyne 37947
WPS904	World Bank Policy on Tobacco		May 1992	O. Nadora 31091
WPS905	Investing in All the People	Lawrence H. Summers	May 1992	M. Fernandez 33766